Amendments to the Specification:

Please replace the paragraph which begins on line 42, page 2 with the following amended paragraph:

Works by Baumgardt et al. ~~and his colleagues described in document reference [1]~~ are without doubt those which have contributed to making the greatest advances in the search for discriminant parameters. D. R. Baumgardt and K.A. Ziegler, "Spectral evidence for source multiplicity in explosions: application to regional discrimination of earthquake and explosion" (Bulletin of Seismological Society of America, vol. 78, pp. 1773-1795, 1988).

Please replace the paragraph which begins on line 46, page 2 with the following amended paragraph:

The variations of the cepstrum, the cepstrum of a signal x being the inverse Fourier transform of the logarithm of the Fourier transform of x, are often used. It can thus be shown that the cepstrum makes it possible to visualise the phenomenon of micro-delays present in the blast signals characterised by a greater variance. A study ~~The document reference [2]~~ also notes this property, nonetheless pointing out that the absence of this characteristic does not permit any deduction concerning the class of the event. P. S. Dysart and J. J. Pulli, "Regional seismic event classification at the NORESS array: seismological measurement and the use of trained neural networks" (Bulletin of Seismological Society of America, vol. 80, pp 1910-1933, 1990).

Please replace the paragraph which begins on line 56, page 2 with the following amended paragraph:

The ratios of the amplitudes of the different types of waves can also serve as discriminants. ~~The~~ A published document ~~reference [3]~~ studies a whole series of amplitude

ratios (P_n/L_g, P_g/L_g, L_g/R_g). These ratios are described as being able to provide good discrimination. P. W. Pomeroy, W. J. Best and T. V. McEvilly, "Test ban treaty verification with regional data: a review" (Bulletin of Seismological Society of America, vol. 72, n°6, pp S89-5129, 1982).

Please replace the paragraph which begins on line 75, page 3 with the following amended paragraph:

The ~~document reference [4] notes that the~~ propagation time of signals from a mine has a constant time t_{Sg}-t_{Pg} for a given recording station. This propagation time is presented as a potential characteristic for a mine, nevertheless remaining less reliable than the preceding characteristics. M. Musil et A. Plesinger, "Discrimination between local microearthquakes and quarry blasts by multilayer perceptrons and Kohonen maps" (Bulletin of Seismological Society of America, vol. 86, n°4, pp. 1077-1090, 1996).

Please replace the paragraph which begins on line 81, page 3 with the following amended paragraph:

A study ~~The document reference [5]~~ suggests using the presence of the surface wave from earthquakes to discriminate them from nuclear explosions at regional distances. S.R. Taylor, "Discrimination between nuclear explosions and earthquakes" (Energy and Earth Sciences, pp. 56-57, 1990). Characterisation of the presence of a surface wave is made indirectly by comparing the magnitudes m_b and M_s. For two seismic events of the same magnitude m_b, the magnitude of the surface wave M_s is generally higher in the case of an earthquake because of the presence of the surface wave than in the case of an explosion. In fact, this crustal Rayleigh wave enters into the calculation of the magnitude M_s and its presence is subordinate to the

phenomenon of shearing, absent in the case of nuclear explosions. Representation of the difference (m_b-M_s) as a function of m_b makes it possible to verify this hypothesis. Nevertheless, the calculation of the magnitude M_s depends on the periodicity of the signal recorded and it is not possible to be rigorous for regional events. On the contrary, the presence of a surface wave corresponding to a sedimentary Rayleigh wave in close seismic signals, characterises events of an artificial nature. A detection method for this second type of surface wave consists of searching for its presence directly in the spectrogram of the signal, its frequency being known (between 0.5 and 1.5 Hz) and its supposed time of arrival can be calculated from its average speed of propagation and the distance separating the epicentre from the recording station.

Please replace the paragraph which begins on line 118, page 4 with the following amended paragraph:

Most of prior art studies use data bases of seismic events of extremely reduced size, with the consequence that they do not permit correct statistical learning. Classification is usually carried out on bases with fewer than one hundred events, ~~as described in the documents reference [2]~~ P. S. Dysart and J. J. Pulli, "Regional seismic event classification at the NORESS array: seismological measurement and the use of trained neural networks" (Bulletin of Seismological Society of America, vol. 80, pp 1910-1933, 1990) and ~~[6]~~ F. U. Dowla, S. R. Taylor and R. W. Anderson, "Seismic discrimination with artificial neural networks: preliminary results with regional spectral data" (Bulletin of Seismological Society of America, vol. 80, n°5, pp. 1346-1373, 1990). One of the biggest bases found in prior art documents comprises only 312 events~~,~~ ~~as described in document [4]~~. M. Musil et A. Plesinger, "Discrimination between local microearthquakes and quarry blasts by multilayer perceptrons and Kohonen maps" (Bulletin of Seismological Society of America, vol. 86, n°4, pp. 1077-1090, 1996). The direct consequence

is that the margins of error for the results presented are very high, which cannot provide great confidence in these results.

Please replace the paragraph which begins on line 137, page 5 with the following amended paragraph:

Moreover, ~~as described in the document reference [1]~~ the events of the two classes to be discriminated can come from two clearly distinct geographic regions, sometimes as far apart as several hundreds of kilometres. D. R. Baumgardt and K.A. Ziegler, "Spectral evidence for source multiplicity in explosions: application to regional discrimination of earthquake and explosion" (Bulletin of Seismological Society of America, vol. 78, pp. 1773-1795, 1988). It is therefore impossible to know to what extent the "colouring" of the signals by the geological layers travelled through influences the discrimination, rather than the signals themselves. But seismologists know that this "colouring" is far from negligible and that localisation information is very important.

Please replace the paragraph which begins on line 153, page 6 with the following amended paragraph:

Finally, the events integrated into the data base are very generally selected according to previously defined criteria: magnitude greater than a certain threshold, signal/noise ratio greater than a certain threshold~~, as described in document reference [2]~~. P. S. Dysart and J. J. Pulli, "Regional seismic event classification at the NORESS array: seismological measurement and the use of trained neural networks" (Bulletin of Seismological Society of America, vol. 80, pp 1910-1933, 1990). But this selection evidently biases the results completely.

Please replace the paragraph which begins on line 173, page 6 with the following amended paragraph:

The detection and geophysical laboratory (LDG) of the CEA has continuously surveyed the seismic activity of the earth since 1962. When a seismic event occurs in any spot on the globe, it is recorded in France by a network of forty-two vertical seismometers located on mainland territory, as shown in Figure 1, the SP stations being short-period stations and the LP stations being long-period stations. A detailed description of the network of seismometers and the propagation of seismic waves in France is given ~~in the document reference [7]~~. M. Nicolas, J.-P. Santoire and P.-Y. Delpech "Intraplate seismicity: new seismotectonic data in western Europe" (Tectonophysics, N° 179, pp. 27-53, 1990).

Please replace the paragraph which begins on line 664, page 22 with the following amended paragraph:

This neuro-fuzzy coding is carried out in several successive stages: definition of sub-groups of characteristics, choice and placing of coding cells assigned to each group, definition of parameters for the region of influence of each cell. The details of this procedure are explained in a published document ~~reference [8]~~. S. Muller, P. Garda, J.-D. Muller, Y. Cansi "Seismic events discrimination by neuro-fuzzy merging of signal and catalogue features" (Physics Chemistry of The Earth (A), vol. 24, N° 3, pp. 201-206, 1999).

Please replace the paragraph which begins on line 710, page 24 with the following amended paragraph:

Learning is carried out in two stages:

- a first phase consists of positioning the fuzzy sets (centres and widths), for example by means of an algorithm called fuzzy C-averages~~, as described in document reference [9]~~. B. T. W. Cheng, D. B. Goldgof, L. 0. Hall, "Fast fuzzy clustering" (Fuzzy Sets and Systems 93, 49-56, 1998).

Please replace the paragraph which begins on line 719, page 24 with the following amended paragraph:

Contrary to the two preceding branches, the neural network with local connections and shared weights (TDNN expert) allows input of the seismic signals themselves and learns to extract by learning not only the decision procedure, but also the discriminant parameters which will serve as base for this decision. This neural network is of the multilayer perceptron type with local connections and shared weights taking as input the pre-processed spectrograms of seismic signals~~, as described in document reference [10]~~. A. Klaassen, X. Driancourt, S. Muller, J.-D. Muller, "Classifying regional seismic signals using TDNN-alike neural networks" (International Conference On Artificial Neural Networks'98, Skövde, Sweden, 2-4 September 1998). These spectrograms are obtained by applying a sliding window Fourier transform on the signal.

Please replace the paragraph which begins on line 763, page 26 with the following amended paragraph:

For the final decision-making, it is assumed that all the outputs are comprised within the real interval[-1,1]. This decision-making consists of an association of answers provided by the three branches in order to increase reliability. In can be carried out by a calculation of mathematical ~~averages~~ average on the homologous outputs of each of the three branches. For each of the three outputs S_i of the overall system one then has:

$$\underset{i=1\ldots3}{S_i} = \frac{1}{3}\sum_{j=1}^{3} S_{ij}$$

where,

- S_i: final decision-making
- S_{ij}: decisions provided by the branches.